EERE-SBIR Technology Transfer Opportunity: H2 Safety Sensors for H2

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H_2 Safety Sensors for H_2

Infrastructure Applications

The Office of Energy Efficiency and Renewable Energy's Fuel Cell Technologies Office (FCTO) works in partnership with industry (including small businesses), academia, and DOE's national laboratories to establish fuel cell and hydrogen energy technologies as economically competitive contributors to U.S. transportation needs.

The work that is envisioned between the SBIR/STTR grantee and Los Alamos National Laboratory would involve Technical Transfer of Los Alamos Intellectual Property (IP) on a Thin-film Mixed Potential Sensor (U.S. Patent 7,264,700) and associated know-how for H_2 sensor manufacturing and packaging.

In Phase-I, DOE EERE expects the grantee to focus on the following:

- Develop low cost electronics packaging manufacturable at high volume; and
- Integrate the LANL sensor into a commercial package that can meet the codes and standards for being deployed at an H_2 fueling station.

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Summary of Technology

Los Alamos National Laboratory with funding from the U.S. Department of Energy's Fuel Cell Technologies Office (FCTO), has developed and tested inexpensive, zirconia-based, electrochemical (mixed-potential) sensors for H_2 detection in air. Mixed potential sensors are a class of electrochemical devices that develop a voltage in response to differences in the electrode properties and the different redox reaction rates of various gases at each electrode/electrolyte/gas interface. Although zirconia-based mixed potential sensors have been investigated for other applications for several decades, issues with signal stability and device-to-device reproducibility have kept them out of the commercial mainstream. Work in the fundamental understanding of the mixed potential phenomena at Los Alamos has led to new materials, methods, and designs for this important class of sensor. Unique Los Alamos patented sensor designs facilitate a reproducible device response resulting from stable electrochemical interfaces. In addition, mixed potential signals with high signal-to-noise result because gas diffusion is through the less catalytically active electrolyte than the electrode. The

sensors show a desirable response time, stability, and resistance to aging and degradation from thermal cycling. Los Alamos and its prototyping partners have developed these sensors and associated electronics and LANL is currently field-testing the technology at a California hydrogen filling station to demonstrate the technology in real-world H_2 applications. Currently, Los Alamos is looking for commercialization partners to license this technology and develop it into a certified commercial H_2 sensor for infrastructure applications.

Los Alamos has built a database consisting of laboratory and field trials testing results, as well as independent validation and verification testing feedback from the DOE's Hydrogen Sensor Testing Laboratory, and will offer specific answers to frequently asked questions (FAQs) regarding this new technology.

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